What is claimed is:

1. A method of making a piezoelectric composite, comprising:

providing a pair of base slabs, each base slab having a substantially planar upper surface;

forming a pair of diced base slabs by dicing the upper surface of each base slab to define a first plurality of longitudinally extending slots therein and a first plurality of longitudinally extending ridges, wherein each first slot has a depth D and width K, wherein each first ridge has a width W, wherein the width W of the first ridge is less than the width K of the first slot, and wherein each adjoining first slot and first ridge has a pitch P equal to the width W and the width K;

positioning the pair of diced base slabs in overlying interdigitation registration with each other such that the first plurality of ridges of one diced base slab is disposed within the first plurality of slots of the other diced base slab;

connecting the pair of diced base slabs so that a plurality of first gaps is defined, each first gap formed between each of the respective first ridges of the connected pair of diced base slabs;

removing a portion of one diced base slab to form a first interdigitated piezoelectric composite slab, the first interdigitated piezoelectric composite slab having a substantially planar upper surface formed from portions of the first ridges of the connected pair of diced base slabs and from portions of the plurality of first gaps;

providing a pair of the first interdigitated piezoelectric composite slabs;

forming a pair of diced first interdigitated piezoelectric composite slabs by dicing the upper surface of each first interdigitated piezoelectric composite slab to define a second plurality of longitudinally extending slots therein the upper surface of the first interdigitated piezoelectric composite slab and a second plurality of longitudinally extending ridges, wherein each second slot has a depth D and width K, wherein each second ridge has a width W,

wherein the width W of the second ridge is less than the width K of the second slot, and wherein the second slot is spaced a shift distance S_1 from an edge of a first ridge, the shift distance S_1 being a fraction of the pitch P;

positioning the pair of diced first interdigitated piezoelectric composite slabs in overlying interdigitation registration with each other such that the second plurality of ridges of one diced first interdigitated piezoelectric composite slab is disposed within the second plurality of slots of the other diced first interdigitated piezoelectric composite slab;

connecting the pair of diced first interdigitated piezoelectric composite slabs so that a plurality of second gaps is defined, each second gap formed between each of the respective second ridges of the connected pair of diced first interdigitated piezoelectric composite slabs; and

removing a portion of one diced first interdigitated piezoelectric composite slab to form a second interdigitated piezoelectric composite slab, the second interdigitated piezoelectric composite slab having a volume ratio that is less than the volume ratio of the first interdigitated piezoelectric composite slab.

2. The method of Claim 1, wherein the first gap is approximately the same size as the second gap.

3. The method of Claim 1, wherein the dicing steps are accomplished using any combination of mechanical abrasive sawing, laser cutting, ultrasonic cutting, electrodischarge machining, wet etching, and dry etching.

4. The method of Claim 1, further comprising the step of prewetting at least one of the diced base slabs with a settable polymeric material prior to interdigitation, the polymeric material bonding the pair of diced base slabs upon subsequent interdigitation.

5. The method of Claim 4, wherein the polymeric material substantially fills the first gap.

6. The method of Claim 4, further comprising the step of prewetting at least one of the diced first interdigitated piezoelectric composite slabs with a settable polymeric material prior to interdigitation, the polymeric material bonding the pair of diced first interdigitated piezoelectric composite slabs upon subsequent interdigitation.

7. The method of Claim 6, wherein the polymeric material substantially fills the second gaps.

8. The method of Claim 1, wherein the each diced base slab and each diced first interdigitated piezoelectric composite slab are diced such that P>K>W.

9. The method of Claim 8, wherein the shift distance S_1 is substantially equal to 1/4P.

10. A method of making a piezoelectric composite, comprising:

providing a pair of base slabs, each base slab having a substantially planar upper surface;

forming a pair of diced base slabs by dicing the upper surface of each base slab to define a first plurality of longitudinally extending slots therein and a first plurality of longitudinally extending ridges, wherein each first slot has a depth D and width K, wherein each first ridge has a width W, wherein the width W of the first ridge is less than the width K of the first slot, and wherein each adjoining first slot and first ridge has a pitch P equal to the width W and the width K;

positioning the pair of diced base slabs in overlying interdigitation registration with each other such that the first plurality of ridges of one diced

base slab is disposed within the first plurality of slots of the other diced base slab;

connecting the pair of diced base slabs so that a plurality of first gaps is defined, each first gap formed between each of the respective first ridges of the connected pair of diced base slabs;

removing a portion of one diced base slab to form a first interdigitated piezoelectric composite slab, the first interdigitated piezoelectric composite slab having a substantially planar upper surface formed from portions of the first ridges of the connected pair of diced base slabs and from portions of the plurality of first gaps;

providing a pair of the first interdigitated piezoelectric composite slabs;

forming a pair of diced first interdigitated piezoelectric composite slabs by dicing the upper surface of each first interdigitated piezoelectric composite slab to define a second plurality of longitudinally extending slots therein the upper surface of the first interdigitated piezoelectric composite slab and a second plurality of longitudinally extending ridges, wherein each second slot has a depth D and width K, wherein each second ridge has a width W, wherein the width W of the second ridge is less than the width K of the second slot, and wherein the second slot is spaced a distance shift S_1 from an edge of a first ridge, the shift distance S_1 being a fraction of the pitch P;

positioning the pair of diced first interdigitated piezoelectric composite slabs in overlying interdigitation registration with each other such that the second plurality of ridges of one diced first interdigitated piezoelectric composite slab is disposed within the second plurality of slots of the other diced first interdigitated piezoelectric composite slab;

connecting the pair of diced first interdigitated piezoelectric composite slabs so that a plurality of second gaps is defined, each second gap formed between each of the respective second ridges of the connected pair of diced first interdigitated piezoelectric composite slabs; and

removing a portion of one diced first interdigitated piezoelectric composite slab to form an intermediate interdigitated composite slab, the intermediate interdigitated composite slab having an upper surface.

11. The method of Claim 10, further comprising:

providing a pair of intermediate interdigitated composite slabs;

forming a pair of diced intermediate interdigitated composite slabs by dicing the upper surface of each intermediate interdigitated composite slab to define a third plurality of longitudinally extending slots therein the upper surface of the intermediate interdigitated composite slab and a third plurality of longitudinally extending ridges, wherein each third slot has a depth D and width K, wherein each third ridge has a width W, wherein the width W of the third ridge is less than the width K of the third slot, and wherein the third slot is spaced a shift distance S_2 from a portion of a second ridge such that the third slot is spaced from the second slot, the shift distance S_2 being a fraction of the pitch P;

positioning the pair of diced intermediate interdigitated composite slabs in overlying interdigitation registration with each other such that the third plurality of ridges of one diced intermediate interdigitated composite slab is disposed within the third plurality of slots of the other diced intermediate interdigitated composite slab;

connecting the pair of diced intermediate interdigitated composite slabs so that a plurality of third gaps is defined, each third gap formed between each of the respective second ridges of the connected pair of diced first interdigitated piezoelectric composite slabs;

removing a portion of one diced intermediate interdigitated composite slab to form a third interdigitated piezoelectric composite slab, the third interdigitated piezoelectric composite slab having a volume ratio that is less than the volume ratio of the first and second interdigitated piezoelectric composite slabs.

12. The method of Claim 11, wherein the first gap, the second gap, and the third gap are approximately the same size.

13. The method of Claim 11, wherein the dicing steps are accomplished using any combination of mechanical abrasive sawing, laser cutting, ultrasonic cutting, electrodischarge machining, wet etching, and dry etching.

14. The method of Claim 10, further comprising the step of prewetting at least one of the diced base slabs with a settable polymeric material prior to interdigitation, the polymeric material bonding the pair of diced base slabs upon subsequent interdigitation.

15. The method of Claim 14, wherein the polymeric material substantially fills the first gap.

16. The method of Claim 14, further comprising the step of prewetting at least one of the diced first interdigitated piezoelectric composite slabs with a settable polymeric material prior to interdigitation, the polymeric material bonding the pair of diced first interdigitated piezoelectric composite slabs upon subsequent interdigitation.

17. The method of Claim 16, wherein the polymeric material substantially fills the second gaps.

18. The method of Claim 11, further comprising the step of prewetting at least one of the diced intermediate interdigitated composite slabs with a settable polymeric material prior to interdigitation, the polymeric material bonding the pair of diced intermediate interdigitated composite slabs upon subsequent interdigitation.

19. The method of Claim 18, wherein the polymeric material substantially fills the third gaps.

20. The method of Claim 11, wherein the each diced base slab, each diced first interdigitated piezoelectric composite slab, and each diced intermediate interdigitated composite slab are diced such that P>K>W.

21. The method of Claim 11, wherein the shift distance S_1 is substantially equal to 1/8P.

22. The method of Claim 21, wherein the shift distance S_2 is substantially equal to 1/8P.

23. The method of Claim 11, wherein the shift distance S_1 is substantially equal to 1/6P.

24. The method of Claim 23, wherein the shift distance S_2 is substantially equal to 1/6P.

25. A method of making a composite, comprising:

providing a pair of base slabs, each base slab having a substantially planar upper surface;

forming a pair of diced base slabs by dicing the upper surface of each base slab to define a first plurality of longitudinally extending slots therein and a first plurality of longitudinally extending ridges, wherein each first slot has a depth D and width K, wherein each first ridge has a width W, wherein the width W of the first ridge is less than the width K of the first slot, and wherein each adjoining first slot and first ridge has a pitch P equal to the width W and the width K;

positioning the pair of diced base slabs in overlying interdigitation registration with each other such that the first plurality of ridges of one diced

base slab is disposed within the first plurality of slots of the other diced base slab;

connecting the pair of diced base slabs so that a plurality of first gaps is defined, each first gap formed between each of the respective first ridges of the connected pair of diced base slabs;

removing a portion of one diced base slab to form a first interdigitated composite slab, the first interdigitated composite slab having a substantially planar upper surface formed from portions of the first ridges of the connected pair of diced base slabs and from portions of the plurality of first gaps;

providing a pair of the first interdigitated composite slabs;

forming a pair of diced first interdigitated composite slabs by dicing the upper surface of each first interdigitated composite slab to define a second plurality of longitudinally extending slots therein the upper surface of the first interdigitated composite slab and a second plurality of longitudinally extending ridges, wherein each second slot has a depth D and width K, wherein each second ridge has a width W, wherein the width W of the second ridge is less than the width K of the second slot, and wherein the second slot is spaced a shift distance S_1 from an edge of a first ridge, the shift distance S_1 being a fraction of the pitch P;

positioning the pair of diced first interdigitated composite slabs in overlying interdigitation registration with each other such that the second plurality of ridges of one diced first interdigitated composite slab is disposed within the second plurality of slots of the other diced first interdigitated composite slab;

connecting the pair of diced first interdigitated composite slabs so that a plurality of second gaps is defined, each second gap formed between each of the respective second ridges of the connected pair of diced first interdigitated composite slabs; and

removing a portion of one diced first interdigitated composite slab to form a second interdigitated composite slab, the second interdigitated

composite slab having a volume ratio that is less than the volume ratio of the first interdigitated composite slab.

26. The method of Claim 25, wherein the first gap is approximately the same size as the second gap.

27. The method of Claim 25, wherein the dicing steps are accomplished using any combination of mechanical abrasive sawing, laser cutting, ultrasonic cutting, electrodischarge machining, wet etching, and dry etching.

28. The method of Claim 25, further comprising the step of prewetting at least one of the diced base slabs with a settable polymeric material prior to interdigitation, the polymeric material bonding the pair of diced base slabs upon subsequent interdigitation.

29. The method of Claim 28, wherein the polymeric material substantially fills the first gap.

30. The method of Claim 28, further comprising the step of prewetting at least one of the diced first interdigitated composite slabs with a settable polymeric material prior to interdigitation, the polymeric material bonding the pair of diced first interdigitated composite slabs upon subsequent interdigitation.

31. The method of Claim 30, wherein the polymeric material substantially fills the second gaps.

32. The method of Claim 25, wherein the each diced base slab and each diced first interdigitated composite slab are diced such that $P>K>W$.

33. The method of Claim 32, wherein the shift distance S_1 is substantially equal to 1/4P.

34. A piezoelectric composite produced in accordance with the method of Claim 25.

35. A transducer produced in accordance with the method of Claim 1.

36. A transducer produced in accordance with the method of Claim 10.